MISSOURI RIVER

Master Water Control Manual Review and Update Study

FACT SHEET

Hydropower

This Fact Sheet provides a brief overview of a specific topic important to the Master Water Control Manual Review and Update Study process. Information contained in this Fact Sheet is summarized from technical reports and the preliminary Revised Draft Environmental Impact Statement.

Summary

Hydropower provides about 9 percent of the region's electrical energy. The benefits of using hydropower to generate energy include relatively low cost, ability to generate amounts of energy in response to peak energy demands (efficient peaking), and availability as a rapid emergency power source. Drought conditions can have a major impact on hydropower generation. Hydropower benefits to the region are calculated by estimating the cost of replacement by the next least expensive energy source. Total average annual hydropower benefits for the 100-year study period range from $696.1 million per year (C44) to $675.5 million per year (C18). Alternative C44 results in a positive change of about 3 percent from the CWCP, and alternative C18 results in almost no change from the CWCP.

Existing Conditions

At the six Mainstem Reservoir System dams, there are 36 hydropower units with a combined capacity of 2,435 megawatts. These units have provided an average of 10.2 million megawatt-hours per year, or about 9 percent of the energy used in the Mid-continent Area Power Pool region. This region includes Iowa, Minnesota, Nebraska, North Dakota, and parts of Illinois, Montana, and Wisconsin. The Western Area Power Association markets the power generated by the Missouri River. The Corps constructed these hydroelectric facilities as part of a larger effort to develop multipurpose water projects with functions other than power generation including flood control, irrigation, navigation, recreation, and fish and wildlife. The projects must be operated in a way that balances their authorized purposes. At individual dams, daily power releases are normally adjusted to coordinate with these other project purposes.

The hydropower generating capacity that is available from the mainstem dams at any time varies with the water-surface elevations of the reservoirs ("head" on the units). For example, as the reservoir elevation falls during long-term droughts, the generation capacity (capability) of the system decreases. During the 1987 to 1993 drought, power production fell sharply. In 1992, lower lake levels and reduced releases resulted in power production at 65 percent of normal. Power production in 1993 was even lower due to reductions in system releases for flood control.

Power generation at the six mainstem dams generally must follow the seasonal pattern of water movement through the system. However, adjustments have been made to the extent possible to provide maximum power production during the summer and winter months when demand is high. Oahe Dam and Big Bend Dam power generation is relatively high during the winter. Because system release in the winter is low, the winter Oahe Dam and Big Bend powerplant releases must be stored in Lake Francis Case. To allow for this, the water level in Lake Francis Case is drawn down during the fall of each year.

Hydropower has some special characteristics that make it an especially valuable power resource, including efficient peaking capabilities, rapid rate of unit startup and stopping, and rapid availability for emergencies. The value of the energy produced by hydropower varies from season to season, depending on water conditions and the power demand. The higher the demand, the greater the value of hydropower. Because demand is greatest in summer and winter, energy produced during these seasons is of greater overall value than energy produced in the spring and fall. This value is greatest when the hydropower units have sufficient water to generate energy at full capacity levels.

Comparison of the Alternatives

The impacts to hydropower generation were estimated by evaluating the total average annual benefits of hydropower generation ($Millions) with respect to alternative replacement costs. The analysis is based on the fact that a decrease in hydropower generation would require generation by other, more expensive resources, including coal, natural gas, and nuclear power. The predominance of hydropower is an economic benefit to the region. Because water availability in the system varies from year to year, the analysis used historical data for a 100-year period (1897 to 1997) to compare average annual economic benefits of hydropower under the alternatives.

The figure illustrates the average annual hydropower benefits for the eight representative alternatives. Average annual hydropower benefits for the 100-year study period range from $696.1 million per year (C44) to $675.5 million per year (C18). Alternative C44 results in a positive change of about 3 percent from the CWCP and alternative C18 results in almost no change.

Total average annual hydropower benefits